

Atomic Energy  
of Canada Limited

1980-81  
Annual Report

AR48





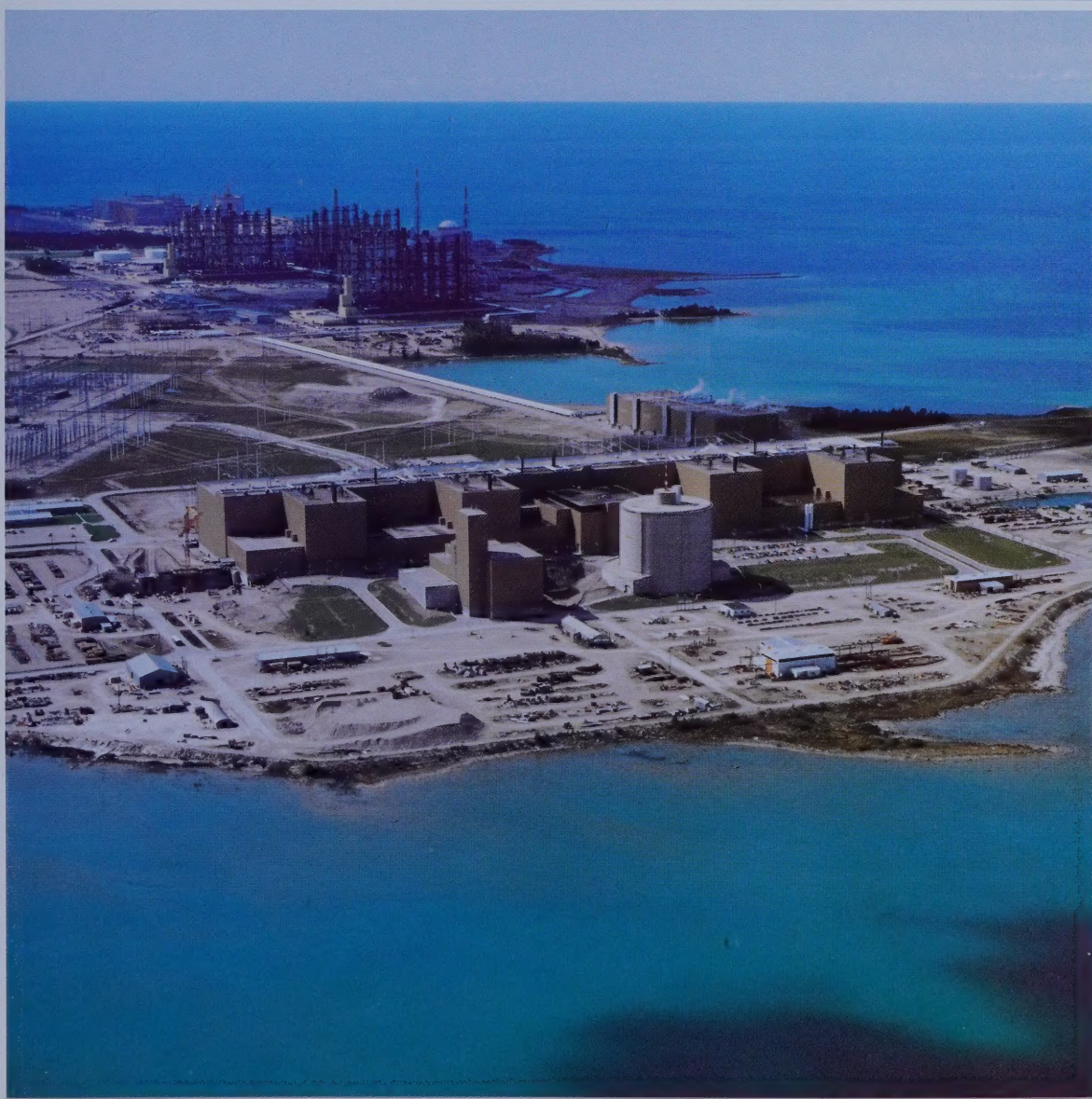


CANDU reactors at Ontario Hydro's Bruce Generating Station took three out of four top places in world reactor performance for 1980 (see page 27 for details).



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# The Board of Directors

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**Robert Després\***, O.C., M.Comm., C.G.A., R.I.A., Chairman of the Board (Director from October 3, 1980, Chairman of the Board from 15 November 1980)

**James Donnelly\***, A.R.T.C., President (Acting Chairman until 15 November 1980)

**M. A. Cohen**, Q.C., B.A., LL.M., Deputy Minister, Department of Energy, Mines and Resources (from 23 April 1980)

**D. A. Golden†\***, O.C., LL.B., LL.D., Chairman of the Board, Telesat Canada

**H. W. Macdonell\***, Q.C., B.Comm., Partner, McCarthy & McCarthy

**G. M. MacNabb†\***, B.Sc., D.Sc., President, Natural Sciences and Engineering Research Council

**D. J. Smith†**, President and owner of Ellis-Don Ltd., General Contractors

**I. A. Stewart**, B.A., M.A., Ph.D., Rhodes Scholar, Deputy Minister, Department of Finance

**A. G. Swanson\***, B.Sc., President and Director of Marline Oil Corporation

**H. G. Thode\***, C.C., M.B.E., Ph.D., F.R.S., Professor Emeritus (active) McMaster University

\*Executive Committee

†Audit Committee

# Letter of Transmittal



The Honourable Marc Lalonde, P.C., Q.C., M.P.  
Minister of Energy, Mines and Resources,  
House of Commons,  
Ottawa, Ontario

June 29, 1981

Dear Mr. Lalonde:

In accordance with sub-section 75(3) of the Financial Administration Act, I am pleased to submit the Annual Report of Atomic Energy of Canada Limited for the fiscal year ended March 31, 1981, together with the financial statements and Auditor's Report.

In my first six months with AECL, I have had an opportunity of visiting all operating companies and learning about their diverse and complex research, engineering, manufacturing and marketing operations. I have met with many of the staff at these sites and can report that AECL is well equipped both in the loyalty of its staff and its competence to advance the scope of the work being done to preserve and further Canada's unique nuclear energy option.

To achieve its mandate the Company is fortunate in being able to benefit from the policy guidance of a Board of Directors with wide representation from business, government and the scientific and academic worlds. During the year, the Board held ten meetings, three of which took place at AECL establishments in Glace Bay, Chalk River and Sheridan Park giving members an opportunity to meet staff and see the work in progress. During the course of the year, we approved the Nuclear Fuel Waste Management Program, the financial restructuring proposal and both the long-range corporate plans and the operating companies' business plans.

Three Board members, Messrs. David M. Culver, Laurent A. Picard and W. Maurice Young retired in June 1980 and, on behalf of the Company, I wish to extend our thanks for their invaluable contribution. I wish also to welcome Marshall A. Cohen, Deputy Minister, Department of Energy, Mines and Resources, who rejoined the Board in April 1980.

The forward planning done by AECL and our own Board deliberations have identified many challenges which we must face in this decade. The years ahead are going to be difficult ones calling for the sagacious deployment of all our resources. I am sure, however, that with the support of our staff and management, the counsel of our directors and the co-operation of government, we can overcome these difficulties and make a fitting contribution in this vital field of nuclear energy.

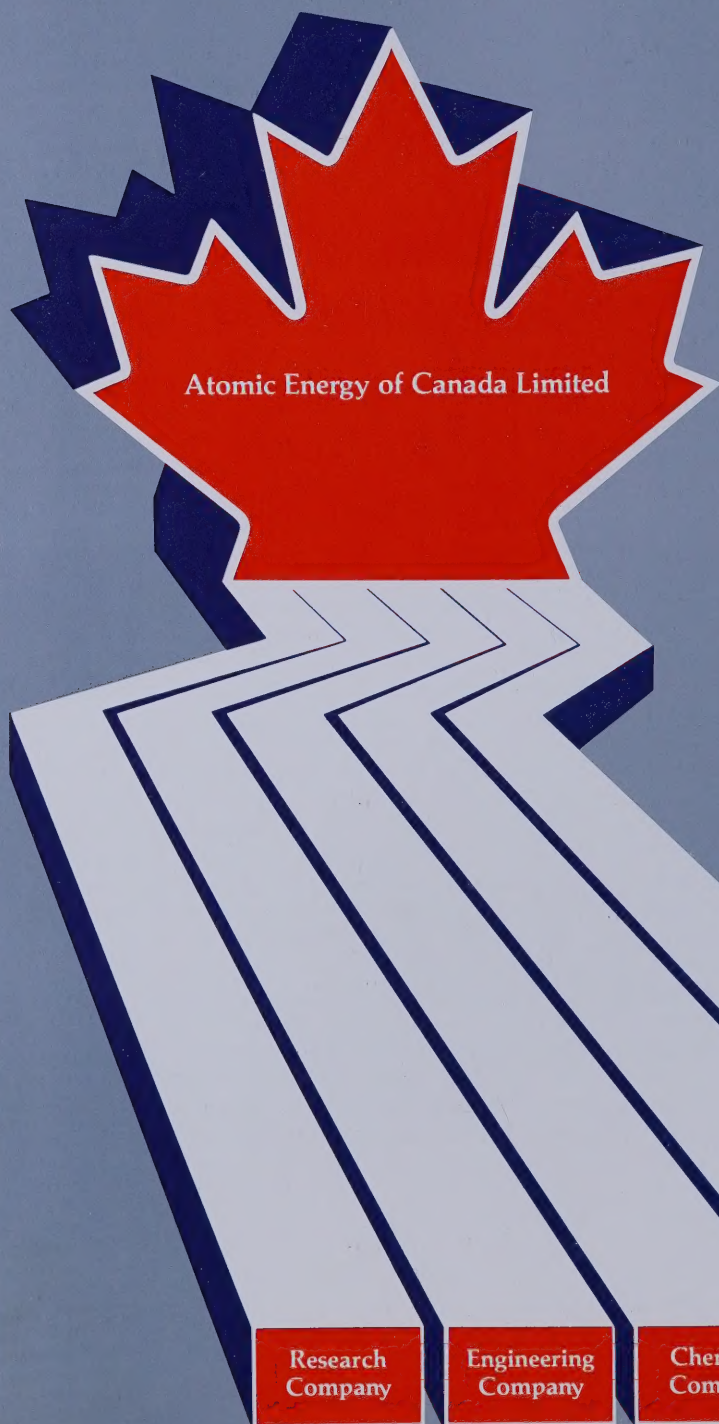
Respectfully submitted,

A handwritten signature in dark ink, reading "Robert Després". The signature is written in a cursive, flowing style.

Robert Després  
Chairman of the Board



# The Company



**Atomic Energy of Canada Limited**

## Executive Officers

**Robert Després**, O.C., M.Comm., C.G.A.,  
R.I.A., Chairman of the Board

**James Donnelly**, A.R.T.C., President

**P.R. Cote**, Ph.D., Vice-President, Corporate  
and Intergovernmental Affairs

**James Hardwick**, Vice-President,  
Special Projects

**H.T. Hughes**, B.Comm., Vice-President,  
Personnel

**J.H. Langstaff**, B.Sc., M.B.A., A.M.P.,  
Corporate Vice-President

**A.J. Mooradian**, Ph.D., F.R.S.C.,  
Vice-President, Research and  
Development

**W.P. O'Neill**, B.A., C.A., Vice-President,  
Finance

**G.A. Pon**, Ph.D., Vice-President,  
Engineering

**R. Veilleux**, B.Sc., Corporate Secretary

**E. Deslauriers**, C.A., Treasurer

**Terence Wardrop**, Q.C., General Counsel

**Research  
Company**

**R.G. Hart**, B.A.,  
Executive  
Vice-President

**Engineering  
Company**

**D.S. Lawson**, B.Sc.,  
Executive  
Vice-President

**Chemical  
Company**

**W.G. Hatton**, B.Sc.,  
Executive  
Vice-President

**Radiochemical  
Company**

**J.M. Beddoes**,  
B.Sc., P.Eng.  
Executive  
Vice-President

**International**

**W.L. Creighton**,  
B.S.E.E., B.S.M.E.,  
President



# President's Report



The role of nuclear power as one of the world-wide energy options has been reinforced by the events of this year as world oil prices continue to increase and the limitations of conservation and new energy sources become more evident. In the developing countries, the dependence on imported oil is forcing nations toward bankruptcy. It is in those very countries that the largest increases in population will occur and if they are to maintain, let alone improve, their standards of life then adequate supplies of energy must be provided.

Advanced nations such as Canada have a clear duty to pursue policies which will release oil supplies for less-favoured nations, at the same time finding acceptable and safe means to share technology with those countries which have sufficient infrastructure to benefit from it.

There is growing evidence of the suitability of the CANDU system for many such countries. The continued evidence of the system's superiority and the growing overseas experience in the construction of CANDU stations have stimulated world interest. This year has seen several hitherto uncommitted countries expressing serious interest in the Canadian system. What is perhaps even more encouraging is that the countries which have already purchased CANDUs are showing an interest in expanding their commitment.

I believe that we now have in AECL a Company

both organizationally and financially poised to respond to the impetus created by this challenging market situation. We have completed the process of forming a new management team which combines demonstrated performance at the executive level both in the public and private sector. We have established a corporate planning cycle which can encompass the far horizon necessary in an industry such as ours and at the same time allow for the determination of immediate business goals. We have in place a system of corporate monitoring which enables us to measure the performance of our diverse operations with accuracy without the penalty of inflexibility in the rapidly changing world of the 80s.

This year has seen a milestone event with the reorganization of the Corporation's financial structure. The forgiveness of outstanding debt on the Quebec and Nova Scotia heavy water plants has assisted materially in removing a major obstacle to the long term future financial viability for the Company.

Gross revenues from Company transactions again rose in the year to \$570 million, an increase of \$73 million over the same period last year. Net income was \$13,467,000, representing the third successive year of steadily increasing profit from all operations. Steam generator repairs and operating losses on our prototype generating stations substantially eroded a record operating year in all Divisions.

Demand for AECL's engineering services was again at capacity level as this division exerts maximum efforts to complete the 600 MW units in Argentina, Korea, Point Lepreau in New Brunswick, and at Gentilly in Quebec, all due for start-up within the next 18 months. No less is the demand from Ontario Hydro for the earliest completion of the Pickering B and Bruce B power stations to follow in 1982 and onwards. However, this high level of workload cannot be anticipated through the 80s without further export orders.

In the technical area, we are moving towards product design control which will enable us to concentrate on standard reactor designs. A high level of standardization in the 600 MW reactor design has already been achieved. With this design as our standard and the development of a 1000 MW export reactor, we will have a range capable of competing with that which our competitors can offer globally.

Record production levels have been achieved at both our heavy water plants this year. The timely shipment of the Wolsung water marked the completion of existing orders. It would be unwise for the Company to continue to produce water for inventory indefinitely. New reactor orders are essential for this crucial area of our endeavour.

The increase in commercial revenues in our research company confirms our confidence that the research facilities are operating efficiently and imaginatively. The need, however, for increasing government funding for advanced fuel cycle research is now pressing. Our competitors in world markets are offering access to the



potential for breeder reactors and the U.K., France and Germany all have virtually commercial demonstration plants operating or in construction. We believe that thorium and other fuel cycles possible with CANDU type reactors are a more suitable alternative for our marketplace. The adoption of such cycles will demand an increasing commitment by Canada to reprocessing and advanced research.

Canada has long been recognised as a world leader in the application of nuclear energy for medical and industrial radiation processes. Our cancer therapy machines and diagnostic isotopes extend the lives of many millions of people annually. This is a growing business and a major expansion program is under way to meet forecast international demands.

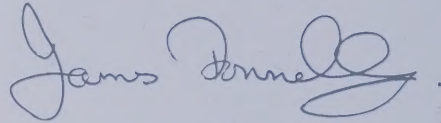
The consolidation of all our overseas activities into AECL International is another step in a more aggressive approach to these difficult markets. The enormous demands placed on the corporation and on Canada's trading infrastructure as we compete with world-wide industrial giants operating a widely established technology, calls for inventiveness, entrepreneurship and diligence not often attributed to Canadian enterprises. Only if we have a national will to support the high technology endeavours will we muster the competence for the industry to survive.

In pursuing the development of this export market for CANDU, we must not lose sight of the underlying rationale of the retention of the national nuclear option. No country can expect to sustain a reactor export program that is not based on a strong domestic one. We fulfill that requirement today with the programs of Ontario Hydro, Hydro-Quebec and the New Brunswick Electric Power Commission. Further, we have in place with Ontario Hydro an agreement for their full support in all CANDU marketing activities and we hope to extend such agreements to obtain the support of other nuclear utilities in Canada. It is essential that the domestic program continues to develop whether it be for producing electricity for traditional Canadian consumers or to substitute for oil used in domestic heating or for the building of export dedicated power stations to serve our energy-needy neighbour to the south.

The conclusions of the nuclear industry policy review which has been undertaken by the Government of Canada are expected to be reached at about the time this report is made available. It would, therefore, not be appropriate for me to speculate on this subject except to point out that the energy options available to this and all other industrialised countries are shrinking as the realities of oil-pricing policies and resource availability exert their influence.

We in Canada are in the fortunate position of having developed a nuclear industry which can compete on a world-wide basis as well as providing a sound source of energy for the utilities of this country. Nevertheless, we face at this moment the dilemma of markets, both global and domestic, in which the ordering cycle has been slowed down by political uncertainties and the

generally depressed economic conditions. In such circumstances, it is inevitable that some rationalisation of the industry must take place. Examples of such measures abound but in each successful endeavour the retention of a strong domestic industry has been a *sine qua non*. To achieve this, both the co-operation of the private sector and firm support of government is of vital importance.



James Donnelly  
President and Chief Executive Officer



# Corporate Affairs

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The implementation of comprehensive strategic and long-range planning systems has placed the Company in an improved position to pursue its overall objectives and mandate. These systems, together with already developed short-term operating plans for the five company divisions, a strengthened management team, and established management control practices and mechanisms, permit continuous review and monitoring of actual performance against objectives. With this structure in place, the development of the Company will proceed within a definitive frame of reference.

The Corporation has established a Corporate Development Committee with the objective of defining, evaluating and developing the bases of new nuclear related business opportunities. These will be based on both existing and future technology. Examples of such opportunities are comprehensive after-sales service, electricity export, tar sands applications of nuclear energy, waste management, and small reactors.

Significant progress has been made in the past year in improving overall relations at the Corporate/ Government interface. This is witnessed by the fact that several significant decisions have been taken by the Government this year which together materially affect, in a positive sense, the continued well-being of the Company.

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## Appointment of the Chairman

Mr. Robert Després, O.C., M.Comm., C.G.A., R.I.A., was appointed as Chairman of the Board of AECL in November 1980. The chairmanship had been held on an interim basis by AECL President James Donnelly since the retirement of Mr. T. K. Shoyama in October 1979.

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## Personnel

Full-time continuing staff totalled 7,512 at the end of the year compared 7,075 at the beginning of the year. The main increases resulted from a higher degree of specialization in project management together with increased demands from the projects and a general increase in the level of business activity throughout the Company.

Fourteen renewal agreements were concluded with unions representing salaried and hourly employees in the operating companies. Most were for a two year duration; a three-year contract was negotiated with the union representing professional employees in the Engineering and International Companies. The positive outcome of the negotiations is a tribute to the good working relations that exist in AECL's operating companies and to the sustained efforts made by labour and management at the sites to maintain high levels of

cooperation throughout the Corporation.

Management development and succession programs have been the focus of particular consideration. Emphasis was placed on the institution of programs for upper and middle level executives to allow them to develop a better appreciation of the many issues, opportunities and risks facing the Company in the future.

There has been criticism of the Company's efforts to achieve the objectives of the Official Languages Act, specifically with respect to francophone participation. The Company recognizes that greater efforts are necessary in this area and is devoting itself to the development of a comprehensive action plan to improve francophone participation, particularly in the professional categories.

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## Public and International Affairs

Regular monitoring of public opinion throughout the year indicated a marked increase in general support for nuclear power with an attendant decline in levels of opposition. Considerable fluctuation in these indicators has taken place since the accident at Three Mile Island. At the same time there remains in some quarters considerable reluctance to increase the rate of installation of nuclear power stations. A majority appears to favor a slower increase in nuclear power generation despite a growing recognition of its economic advantages. Two principal issues continue to dominate public attention — reactor safety and the safe and permanent disposal of nuclear waste products. The Corporation continues to address these matters on a priority basis.

Increased emphasis was placed on the exhibit program with a major exhibit being placed in the National Museum of Science and Technology and later in the Houses of Parliament. Extensive support for school programs in energy education was also provided.

With the assistance of an outside consultant, AECL management conducted a review of the objectives and activities of Public Affairs. The results of this study will lead the Company to assume a greater advocacy role in certain areas of nuclear energy while maintaining a policy of open and effective communication with the public.

In December 1980, the Company signed an agreement with the Commission of European Communities providing for exchange of information on spent fuel disposal. The AECL-Euratom agreement provides for periodic information meetings as well as the continued exchange of staff. Corporate personnel also made visits to Italy and the United Kingdom for the purpose of concluding further agreements on the exchange of information and maintaining links with the nuclear organizations of other countries.



# Company Activities

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## Atomic Energy of Canada Limited Research Company

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The primary mission of the Research Company is to provide the scientific and technological base for Canada's nuclear program. The Company operates two major national laboratories, Chalk River Nuclear Laboratories at Chalk River, Ontario and Whiteshell Nuclear Research Establishment at Pinawa, Manitoba. Its work ranges from basic scientific research to the transfer of technology to Canadian industry.

### Basic Research

The Company is active in a number of areas of basic research. Highlights this year included the development of a rapid and inexpensive technique for testing blood cells to detect damage to DNA, the carrier of hereditary information in all living things; the first successful use of a laser to produce laboratory quantities of water enriched in deuterium, the moderator and coolant in CANDU reactors; the development of an accelerator-based, automated carbon-14 dating system to determine the age of environmental and geological samples up to 40,000 years old; the development of a new technique for predicting the chemical fate of radioactive iodine, the radioisotope potentially of most concern in a reactor accident; and successful acceleration of a highly polarized beam of electrons which will make possible further significant research into the fundamental properties of matter.

### Waste Management

The Government approved additional funding for the continuation of the ten-year generic research program to assure the safe and permanent disposal of irradiated CANDU fuel waste.

Among the highlights of this year's work was the completion of an initial safety assessment of a fuel disposal vault sited in a granite formation typical of the Canadian Shield. This assessment indicated that used CANDU fuel deposited in such a facility would not pose any significant hazard to man or the environment. A key element of the fuel waste management program will be verification of the assessment methods through experiments in the Underground Research Laboratory in the Lac du Bonnet batholith near Pinawa, Manitoba. It is not planned to use or store nuclear wastes in this laboratory. Experiments will be limited to geology, mining techniques and related factors.

### Applied Research and Development

Applied research and development aimed at even greater safety, efficiency and reliability of CANDU reactor systems continued. Work was conducted on reactor fuel channels to better define their operating

power limits and the effects of loss of coolant in the channels. Other work included the development of a new alloy to give improved dimensional stability to reactor pressure tubes, the development of improved neutron flux detectors for in-reactor use, and the completion of a facility to test effects such as hydrogen combustion which may occur under certain reactor accident conditions. The Company also continued development of its tritium extraction systems.

### Future Energy Supplies

Nuclear energy can, and indeed must, make a contribution to Canada's efforts to reduce its dependence on oil, both through the substitution of electricity for oil, and through the direct use of heat from nuclear reactors. At Deep River, a hybrid electric/oil space heating experiment is being conducted in 50 AECL-owned homes. Results to date show that a 5000 watt electric heater reduces oil consumption by more than 70 per cent. The Company also played a key role in launching an Industrial Energy Park to use steam from Ontario Hydro's Bruce Generating Station. Longer term projects include experiments to test the concept of small reactors for space heating and a study on the use of nuclear heat in the recovery of liquid fuels from oil sands.

Accelerator development, underlying the accelerator breeding of fuel, resulted in several new advances in beam technology. Advanced-fuel-cycle work, aimed at the development of a thorium fuel cycle for CANDU reactors that would greatly extend nuclear fuel resources, continued at the laboratory level. Highlights included: the fabrication of fuel bundles containing plutonium for in-reactor tests; the successful operation of the thorium fuel reprocessing experiment with active fuel; and the irradiation of thorium fuel elements to conditions close to those required for advanced fuel cycles.

### Sales of Research and Development and Services

In keeping with the Corporate thrust for greater commercial exploitation of its unique capabilities, the Company has established offices at CRNL and WNRE to coordinate the Research Company's growing role in technology licensing, contract research and the provision of unique services to utilities and industry. Examples of such services include the remote repair of pipe leaks at Douglas Point Generating Station in collaboration with the Engineering Company and Ontario Hydro, and the licensing of non-destructive testing technology for world-wide application.

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## Atomic Energy of Canada Limited Radiochemical Company (Commercial Products)

Overall business activity increased significantly in 1980-81 despite poor business conditions in the United States market in the first half of the year. The current order backlog, the highest in the Company's history,



demonstrates continued acceptance of this Company's products in a competitive world-wide market.

### **Medical Group**

The group's established product line covers the complete range of high technology products for the radiation treatment of cancer.

The first orders were received for the Company's new Therac 25 medical accelerator, a unit designed and manufactured in Canada and expected to become the choice of major cancer clinics in the 1980s. In the field of treatment planning the Company introduced a new product — Theraplan — in August, designed to link the data from a CT (computerized tomography) scanner to cancer treatment planning systems. Theraplan is quickly gaining market recognition with nine systems already on order.

### **Industrial Group**

A 56 per cent increase in orders received demonstrated the world-wide acceptance of gamma irradiation as a modern industrial process. Orders included ten full-scale irradiators and 17 million curies of Cobalt-60. Even wider application of gamma processing technology in new areas such as food preservation and waste treatment is expected in the 1980s.

Most of the Cobalt-60 used as the major source of gamma radiation in the group's irradiators is produced in the CANDU reactors at Ontario Hydro's Pickering generating station. Close to 50 million curies of Canadian-produced Cobalt-60 are in use world-wide, primarily to upgrade standards of medical care.

During the year the Second International Gamma Processing Seminar, held in Ottawa and organized by the Industrial Group, attracted 115 delegates from 24 countries.

### **Isotope Group**

The majority of the wide range of isotopes produced and marketed by the group are for use in medical diagnosis. This field of nuclear medicine is one of the most rapidly growing areas of medical technology. The group's orders received increased by 90 per cent over last year, strengthening the Company's position as the major supplier of bulk isotopes in the world.

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## **Atomic Energy of Canada Limited Engineering Company**

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The engineering design of eight major nuclear station construction projects totalling 12,000 MW of electrical capacity is now underway. Additionally, the Company provides continuous support services for the 5,000 MW of CANDU capacity already in operation in Canada. Focus at the end of the year was on completing the design work and providing support for commissioning activities on two 600 MW domestic projects, Gentilly-2 and Point Lepreau, and on final stages of construction of two 600 MW off-shore projects in

Argentina and the Republic of Korea. The supply of engineering documentation for the 600 MW Romanian project met contractual obligations and requirements at the site. Design work continued in support of site construction at Ontario Hydro's Pickering "B", Bruce "B" and Darlington stations.

The engineering of CANDU reactors in the 900-1100 MW range based on Bruce/Darlington designs was reviewed to develop design programs incorporating the requirements of the export marketplace. The future designs will take account of likely international safety requirements as well as features necessary for high seismic activity zones and sites with high cooling water temperatures.

A major effort was devoted to the replacement of damaged tubing in the steam generators of the Gentilly-2, Point Lepreau and Cordoba stations. The tubes were damaged by the stress relief process used by the supplier during the final stages of production. Repair to original quality standards and reinstallation of the Gentilly-2 and Point Lepreau steam generators was completed in March 1981 and those at Cordoba were completed in mid-April.

The CANDU support role carried out at the Sheridan Park Engineering Laboratory featured development of new approaches to remotely controlled repairs at currently operating stations.

The Company organization evolved during the year to strengthen its engineering capability, expand its commercial activities and further develop its human resources.

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## **Atomic Energy of Canada Limited International**

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AECL's reactor marketing division, formed in 1979, assumed the leading role in a vigorous campaign to promote CANDU in the growing number of countries which have expressed interest in this reactor system.

World interest in CANDU, stimulated by continued rises in the price of oil on the world market, overall concerns related to energy security and the continued exceptional performance of the operating reactors in Ontario, has significantly increased the number of inquiries to the International Company. Canadian industry, Ontario Hydro and other utilities, and other AECL companies have co-operated with the International Company in meeting the demand both for technical consulting and marketing assistance. This has resulted in a much strengthened Canadian nuclear power systems marketing effort, much enhanced this past year by the active participation of senior officials of the Federal Government and Ministers of the Crown.

Symposia and exhibits were presented in Indonesia, Mexico, Yugoslavia, and Korea.

With respect to the management of current projects, work on the CANDU units at Wolsung, Republic of Korea and at Cordoba in Argentina has progressed



well. Rapid progress on the Wolsung project brought it to a stage of 70 per cent completion; the heavy water was delivered to site and preparations for the start of the commissioning program were completed. The unit will go into service in 1982.

Work at Cordoba went ahead on schedule. Mechanical piping installation for the reactor building continued, with completion due by the summer of 1981. Control and instrumentation installation commenced in October 1980. This station is scheduled to go into service in early 1983.

In Romania, concrete work for the first Cernavoda unit was carried out but project progress was slowed awaiting the development of a final procurement program by Romenergo, the Romania state trading agency responsible for nuclear procurement. Negotiations took place during the year for additional agreements with AECL to cover engineering and procurement services for additional CANDU units.

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### **Atomic Energy of Canada Limited Chemical Company**

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The Company's two operating heavy water plants at Port Hawkesbury and Glace Bay in Cape Breton continued to perform at record production levels during the year. The major delivery of heavy water during the year was the shipment to the Republic of Korea for the CANDU reactor at Wolsung.

In line with the Company's new strategy, aimed at development of new technology and new heavy water markets, a major reorganization of the Technology, Engineering and Marketing division was undertaken.

Many of the Company's activities during the year reflected this new thrust. These included discussions and presentations relating to heavy water sales and supply options and heavy water production technologies with many prospective export and domestic customers.

In its continuing effort to develop technology aimed at energy conservation and the utilization of waste heat, the Company, together with a number of federal and provincial agencies, put into operation an experimental greenhouse using waste heat from its Glace Bay plant. The first crop of tomatoes and cucumbers from the greenhouse was harvested in Spring 1981.



## Financial Section

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- Financial Review
- Financial Statements



# Financial Review

## Revenues

Revenues from the Company's commercial operations continued to reflect the improvement resulting from the emphasis directed towards expanding the Company's markets. For 1980-81, revenues totalled \$570.2 million, an increase of 14.7 per cent from the previous year.

Engineering service revenues for the year amounted to \$101.2 million, reflecting the continuing demand for the Company's CANDU engineering expertise both for domestic and international projects. These services are in support of nine CANDU nuclear power reactors in operation and an additional seventeen under construction.

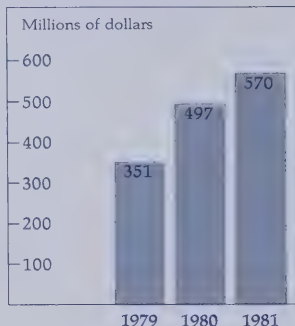
Activities related to the export of materials and services for the construction of nuclear power plants offshore declined to \$185.3 million as projects underway in Argentina and Korea are nearing completion. This was offset by increased sales of heavy water primarily resulting from the shipment to Korea of the initial reactor load required for the plant now under construction.

Radiation equipment and isotope revenues increased by 13.1 per cent to \$55.2 million. This continues to reflect the increasing demand for the Company's industrial radiation and medical diagnostic products despite a temporary downturn in the U.S. market during the year.

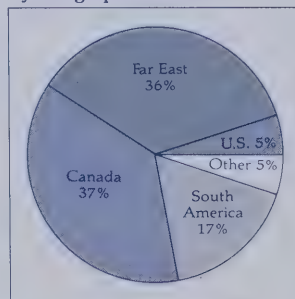
Investment income decreased by 6.6 per cent to \$30.5 million resulting from maintenance shutdowns of the Pickering Generating Station. The continuing general increase in interest rates favorably affected interest income earned on the investment of temporarily surplus funds which amounted to \$77.6 million, an improvement of 11.5 per cent over the previous year.

Revenues from customers in Canada and customers in the Far East and South America account for 90 per cent of the Company's commercial revenues.

Commercial Revenues



Commercial Revenues by Geographical Area

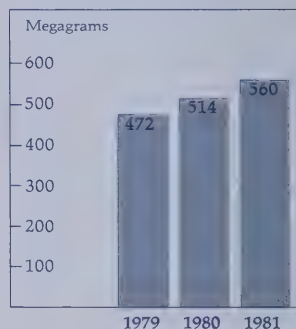


## Heavy Water Production

Production at the Company's two operating heavy water plants reached record levels during the year at 560 megagrams. This high level of production together with other production efficiencies and the effects of the Company's refinanced structure has helped offset production cost increases mainly due to escalating energy costs.

As a result of heavy water shipments to the Wolsung reactor project in Korea, heavy water inventory remained at approximately the previous year's level.

Heavy Water Production



## Nuclear Research and Development

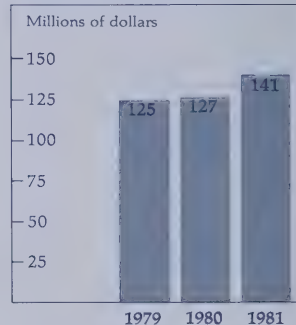
Research and development expenditures before earned revenues increased during the year by 10.6 per cent to \$140.7 million.

The nuclear fuel waste management program and studies related to health and environmental effects of radiation continue to receive high priority as evidenced by increased allocation of resources to these programs. Expenditures on the waste management program increased by 20.5 per cent to \$10.6 million and on the health and environmental studies program the increase was 19.4 per cent to \$3.7 million.

Activities on safeguards systems have followed the requirements of reactor construction schedules. Spending on underlying and advanced systems, power reactor systems and advanced fuel cycles totalling \$30.3 million was effectively at the same level as the previous year.

The net cost of nuclear research and development not funded by Parliamentary appropriation or by the revenues from contract research work is funded by other commercial revenues of the Company when incurred.

Nuclear Research and Development Expenditures





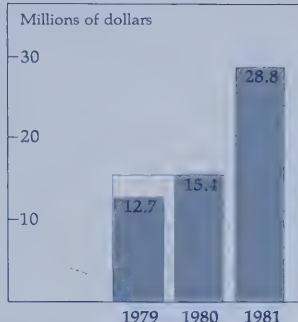
## Operating Profit and Net Income

Profit from commercial operations increased in 1981 by \$13.4 million to \$28.8 million. This was attributable to increased revenues from engineering services, heavy water production activities and a reduction in debt servicing costs resulting from the financial reorganization.

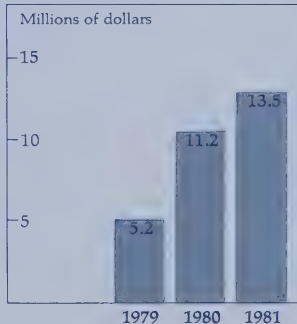
Prototype reactor operations continued to require support from both the Company and the Government. Funding by the Government of the Gentilly-1 station amounted to \$10.2 million. Losses to the Company on the Douglas Point station increased to \$15.0 million mainly due to a seven month shutdown of the reactor for, and the costs associated with, retrofitting newly developed safety systems.

Net income for the year increased to \$13.5 million from \$11.2 million in 1980 resulting from the improved operating profit of commercial operations offset by an increased loss of \$11.0 million in prototype reactor operations.

### Operating Profit



### Net Income



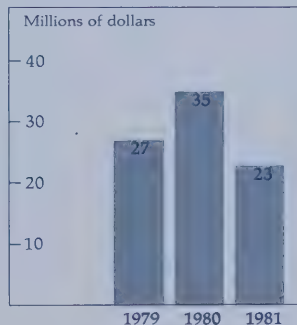
## Financial Position

Working capital decreased by \$81.7 million during the year as outlined in the Statement of Changes in Financial Position. The decrease is largely attributable to the reclassification of heavy water production costs and net reduction in long-term debt of \$31.5 million.

Cash generated from operations was \$23.2 million, a decrease of \$11.7 million from the previous year mainly resulting from increased losses on prototype reactor operations.

The Government of Canada approved a significant financial reorganization of the Company effective April 1, 1980. This reorganization consisted primarily of the

### Cash Flow From Operations



forgiveness of the loans and advances due to the Government with respect to the purchase, rehabilitation and construction of heavy water plants in the amount of \$816.9 million. The Company also decided to write down its investment in these heavy water plants by \$765.4 million which reduced their stated value to a nominal amount. This reorganization provides the Company with an opportunity for the first time in its history to evaluate its operations on a basis more consistent with commercial management practices.

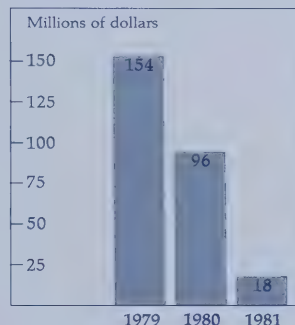
## Capital Expenditures

Capital expenditures including government funded programs amounted to \$18.0 million, compared to \$96.0 million in 1980.

The decrease is mainly due to reduced heavy water plant capital expansion programs.

Capital spending in support of nuclear research and development programs amounted to \$9.6 million in 1981, an increase of \$2.0 million from 1980.

### Capital Expenditures





# Atomic Energy of Canada Limited

## Balance Sheet

As at March 31, 1981  
(thousands of dollars)

	1981	1980
<b>ASSETS</b>		
<b>Current assets</b>		
Cash and short-term investments	\$ 99,034	\$ 88,324
Accounts receivable	156,250	122,275
Inventories	54,566	149,767
	<u>309,850</u>	<u>360,366</u>
<b>Non-current inventory</b>	54,470	—
<b>Long-term receivables</b>	120,971	100,802
<b>Utility financing</b>	685,369	696,013
<b>Investment</b>	98,552	103,399
	<u>959,362</u>	<u>900,214</u>
<b>Fixed assets</b>		
Property, plant and equipment	84,557	81,512
Heavy water plants	—	765,415
	<u>84,557</u>	<u>846,927</u>
	<u>\$ 1,353,769</u>	<u>\$ 2,107,507</u>

The accompanying notes are an integral part of these financial statements.

Approved by the Board



Robert Després, Director



James Donnelly, Director



# Atomic Energy of Canada Limited

## Balance Sheet

As at March 31, 1981  
(thousands of dollars)

	1981	1980
<b>LIABILITIES</b>		
<b>Current liabilities</b>		
Accounts payable and accrued liabilities	\$ 89,035	\$ 78,353
Loans and current portion of long-term debt	73,046	100,923
Deferred revenues and costs	164,320	105,898
Loss provision	53,361	63,453
	<u>379,762</u>	<u>348,627</u>
<b>Long-term debt</b>		
Utility financing	684,291	695,029
Heavy water plant loans	58,663	892,979
Other	106,006	115,103
	<u>848,960</u>	<u>1,703,111</u>
<b>SHAREHOLDER'S EQUITY</b>		
<b>Capital stock</b>		
Authorized — 75,000 common shares		
Issued — 54,000 common shares	15,000	15,000
<b>Contributed capital</b>	96,580	187,827
<b>Retained earnings (deficit)</b>	13,467	(147,058)
	<u>125,047</u>	<u>55,769</u>
	<u>\$ 1,353,769</u>	<u>\$ 2,107,507</u>

# Atomic Energy of Canada Limited

## Statement of Income

For the Year Ended March 31, 1981  
(thousands of dollars)

	1981	1980
<b>Commercial Operations</b>		
<b>Revenues</b>		
International nuclear power projects	\$ 185,340	\$ 260,763
Engineering services	101,210	62,555
Heavy water	120,210	22,652
Radiation equipment and isotopes	55,219	48,845
Investment income	30,539	32,690
Interest income	77,644	69,618
	<u>570,162</u>	<u>497,123</u>
<b>Costs and expenses</b>		
Cost of sales	432,649	352,097
Marketing, administration and other	39,713	32,648
Interest charges	68,952	97,019
	<u>541,314</u>	<u>481,764</u>
<b>Operating profit</b>	<u>28,848</u>	<u>15,359</u>
<b>Nuclear Research and Development</b>		
Expenditures	140,676	127,222
Less:		
Revenue	17,146	12,451
Parliamentary appropriations	123,119	114,654
<b>Net revenue (expense)</b>	<u>(411)</u>	<u>(117)</u>
<b>Prototype Reactor Operations</b>		
Expenditures	34,915	30,394
Less:		
Revenue	9,764	17,559
Parliamentary appropriations	10,181	8,795
<b>Net revenue (expense)</b>	<u>(14,970)</u>	<u>(4,040)</u>
<b>Net income for the year</b>	<u>\$ 13,467</u>	<u>\$ 11,202</u>

The accompanying notes are an integral part of these financial statements.



# Atomic Energy of Canada Limited

## Statement of Contributed Capital

For the Year Ended March 31, 1981

(thousands of dollars)

	<u>1981</u>	<u>1980</u>
Balance at beginning of year	\$ 187,827	\$ 187,827
Reduction in Contributed Capital arising from reorganization	<u>91,247</u>	<u>—</u>
Balance at end of year	<u>\$ 96,580</u>	<u>\$ 187,827</u>

## Statement of Retained Earnings (Deficit)

For the Year Ended March 31, 1981

(thousands of dollars)

	<u>1981</u>	<u>1980</u>
Balance at beginning of year	\$ (147,058)	\$ (158,260)
Elimination of deficit on reorganization	<u>147,058</u>	<u>—</u>
	<u>—</u>	<u>(158,260)</u>
Net income for the year	<u>13,467</u>	<u>11,202</u>
Balance at end of year	<u>\$ 13,467</u>	<u>\$ (147,058)</u>

The accompanying notes are an integral part of these financial statements.

# Atomic Energy of Canada Limited

## Statement of Changes in Financial Position

For the Year Ended March 31, 1981

(thousands of dollars)

	<u>1981</u>	<u>1980</u>
<b>Source of funds</b>		
Funds provided by		
Commercial operations	\$ 28,848	\$ 15,359
Nuclear research and development		
Parliamentary appropriations	123,119	114,654
Excess of expense over revenue	(123,530)	(114,771)
Prototype reactor operations		
Parliamentary appropriations	10,181	8,795
Excess of expense over revenue	(25,151)	(12,835)
Add: Depreciation and amortization	9,779	23,746
	<u>23,246</u>	<u>34,948</u>
Parliamentary appropriations		
Heavy water	65,000	—
Third party loans	4,278	—
New long-term debt	7,351	273,301
Reduction of long-term receivables	1,283	—
Reduction in utility loans	10,644	9,134
	<u>111,802</u>	<u>317,383</u>
<b>Application of funds</b>		
Non current inventory	119,470	—
Additions to property, plant and equipment	7,977	88,690
Increase in long-term receivables	21,452	65,646
Increase in utility loans	—	78,977
Reduction of long-term debt	44,554	37,246
	<u>193,453</u>	<u>270,559</u>
<b>Increase (decrease) in working capital</b>	<u>\$ (81,651)</u>	<u>\$ 46,824</u>
<b>Increase (decrease) in working capital is represented by changes in:</b>		
Cash and short-term investments	\$ 10,710	\$ 53,111
Accounts receivable	33,975	468
Inventories	(95,201)	1,558
Accounts payable	(10,682)	14,253
Deferred revenues and costs	(58,422)	4,201
Loss provisions	10,092	8,998
Loans	27,877	(35,765)
	<u>\$ (81,651)</u>	<u>\$ 46,824</u>

The accompanying notes are an integral part of these financial statements.



## Notes to the Financial Statements

For the Year Ended March 31, 1981

### 1. Significant accounting policies

a) Reporting of operations: The activities of the Company are reported in the Statement of Income under three categories — Commercial Operations; Nuclear Research and Development; Prototype Reactor Operations.

(i) The Commercial Operations comprise:

(a) International Division, which constructs nuclear power plants and provides project management, marketing and engineering services outside Canada;

(b) Engineering Division, which provides marketing, engineering, testing and project management services rendered principally to domestic power utilities and the International Division;

(c) Chemical Division, which produces and sells heavy water;

(d) Radiochemical Division, which manufactures and markets medical and industrial radiation equipment and radioisotopes; and

(e) Corporate operations and investments.

(ii) Nuclear Research and Development comprise:

(a) Nuclear research and development operations conducted at the Chalk River and Whiteshell laboratories. The cost of the research and development program is primarily funded by appropriation from Parliament by way of capital and operating votes which are deducted from the program costs in the Statement of Income.

(iii) Prototype Reactor Operations comprise:

(a) Gentilly-1 prototype nuclear station. The cost of maintaining this prototype is funded by appropriation from Parliament;

(b) Douglas Point nuclear station which is operated by Ontario Hydro for the Company.

b) Nuclear power projects: Nuclear power projects are accounted for on the percentage of completion method. Under this method revenues and related costs of each project are reported in the annual Statement of Income based on the percentage of

completion. When project estimates indicate a probable loss, full provision for the estimated loss is made against current operations. The percentage of completion method is applied on a conservative basis in order to recognize the absence of certainty on these long term projects.

c) Foreign currencies: Monetary assets and liabilities in foreign currencies are recorded in Canadian dollars at current exchange rates. Deferred revenues and costs on uncompleted contracts in foreign currencies are recorded at historical rates on a monthly basis. Gains and losses resulting from foreign currency transactions and balances, which relate to international nuclear power projects, are included in project costs. Other foreign exchange gains and losses are recorded in operations when realized.

d) Inventories:

(i) Valuation: Radiation equipment and materials are valued at the lower of average cost and net realizable value. Maintenance and general supplies are valued at cost. Heavy water inventory is valued at the lower of average cost net of related parliamentary appropriations, if applicable, and net realizable value.

(ii) Classification: Inventories are classified as non current when they are not expected to be sold within the next fiscal year.

e) Plant and property:

(i) Expenditures for research facilities are recorded as program costs in the year of acquisition.

(ii) Other assets are recorded at cost and are depreciated on a straight-line basis over the estimated useful lives of the assets as follows:

Houses	— 50 years
Buildings	— 20 to 40 years
Machinery and equipment	— 5 to 20 years
Nuclear generating stations	— 30 years

f) Comparative figures: Where appropriate, financial data for 1980 has been reclassified to conform with the 1981 format.

## 2. Reorganization

A major reorganization plan was implemented to address certain financial problems of the Company. These problems pertained to the inadequacy of forecast revenues from sales of heavy water to repay the loans and interest charges related to the purchase, rehabilitation and construction of the heavy water plants.

To correct this debt financing problem and to place the Company on a more viable financial basis, the Government of Canada authorized various financial measures which were approved by Parliament effective April 1, 1980 including the forgiveness of the heavy water plant loans and interest totalling \$816.9 million. The Company also received a commitment from the Government for future funding by Parliamentary appropriations of third party loan payments of \$70.3 million, and the funding of heavy water plant operations as required, the latter being repayable in the event of future sales. The current year production has been partially funded by a \$65.0 million appropriation and has not yet been sold. Future funding levels for heavy water production and third party loan payments require annual approval by Parliament.

As part of the reorganization the value of the plants has been written down to a nominal amount

recognizing that the historical capital costs of the Company's heavy water plants, based on present forecasts, would not be recovered from future sales. The reorganization also provides for the elimination of the deficit in the amount of \$147.1 million against Contributed Capital as at April 1, 1980.

The adjustments to Contributed Capital which result from the reorganization are as follows (thousands of dollars):

Forgiveness of heavy water plant loans by Canada including interest	
La Prade	\$442,220
Glance Bay	297,426
Port Hawkesbury	77,302
	<u>816,948</u>
Principal on third party loans	4,278
	<u>821,226</u>
Write down of heavy water plants (Note 7)	765,415
	<u>55,811</u>
Elimination of Deficit	147,058
Reduction in Contributed Capital	<u>\$ 91,247</u>



# Atomic Energy of Canada Limited

## 3. Transactions with the Government of Canada

a) In addition to the transactions described in Note 2, the Government of Canada funds specific nuclear research, development and utilization activities of the Company and provides loan financing for other purposes. During the year the following amounts were utilized:

b) During the year the Company paid \$11.1 million (1980-\$9.7 million) to the Government of Canada as the Corporation's contributions to the Public Service Superannuation Account.

	(thousands of dollars)	
	1981	1980
<b>Budgetary appropriations</b>		
Nuclear research and development	\$123,119	\$114,654
Prototype reactor operations	10,181	8,795
Heavy water		
— Inventory	65,000	—
— Loan payments	9,300	—
— La Prade maintenance	8,623	—
	<u>216,223</u>	<u>123,449</u>
<b>Loans and advances</b>		
Advances to provincial utilities	—	64,900
Heavy water		
— Inventory	—	97,000
— Plants	—	81,600
Other plant	3,600	—
	<u>3,600</u>	<u>243,500</u>
	<u>\$219,823</u>	<u>\$366,949</u>

## 4. Inventories

Inventories comprise the following:

	(thousands of dollars)	
	1981	1980
<b>Current</b>		
Heavy water	\$ 5,161	\$113,661
Radiation equipment and materials	27,749	19,504
Maintenance and general supplies	21,656	16,602
	<u>\$ 54,566</u>	<u>\$149,767</u>
<b>Non-current</b>		
Heavy water at cost less recoverable parliamentary appropriation of \$65.0 million (Note 2)	<u>\$ 54,470</u>	<u>\$ —</u>

## 5. Long-term receivables and utility financing

	(thousands of dollars)			(thousands of dollars)	
	1981	1980		1981	1980
a) Long-term receivables —			b) Utility financing —		
These primarily consist of			Notes receivable from		
lease/sale options due from			provincial utilities to		
foreign governments and			finance nuclear facilities		
companies. Interest rates on			some of which are under		
fixed rate agreements range			construction, at interest rates		
from 7.0% to 10.5% with			varying from 7.795% to		
terms of up to 12 years, and			10.0%. The notes with		
on floating rate agreements			established terms (\$195.0		
interest is based on bank			million) mature through		
offered rates	\$119,925	\$ 92,984	1992. Other notes have a 25		
Other	7,625	13,844	year amortization from the		
	127,550	106,828	"in-service date" of the		
Current portion	6,579	6,026	plants	\$712,999	\$705,873
	\$120,971	\$100,802	Current portion	27,630	9,860
				\$685,369	\$696,013

Refer to Note 9(a) for related debt.

## 6. Investment

Pickering nuclear generating station — Ontario Hydro, the Province of Ontario and the Company are parties to a joint undertaking for the construction and operation of Units 1 and 2 of the Pickering 'A' nuclear generating station, with ownership of these units being vested in Ontario Hydro. Ontario Hydro is committed to make payments over a period terminating in 2001 to each of the parties in

proportion to their capital contributions. These payments, termed "payback", represent in a broad sense the net operational advantage of having the power generated by Pickering Units 1 and 2 as compared with Lambton Units 1 and 2 coal-fired units. The cost of the investment is amortized on a straight-line basis and amounted to \$4.8 million for the year as a charge to operations.



# Atomic Energy of Canada Limited

## 7. Fixed assets (thousands of dollars)

### a) Property, plant and equipment

	Cost	Parliamentary Appropriations	Accumulated Depreciation	Net Book Value
<b>Commercial</b>				
Land	\$ 1,430	\$ 455	\$ —	\$ 975
Buildings	18,355	3,548	9,303	5,504
Machinery and equipment	23,482	7,345	7,217	8,920
Construction in progress	4,149	—	—	4,149
	<u>47,416</u>	<u>11,348</u>	<u>16,520</u>	<u>19,548</u>
<b>Research facilities</b>				
Land	8,761	8,761	—	—
Buildings	59,210	55,106	1,810	2,294
Research reactors and equipment	209,141	198,757	10,359	25
Construction in progress	9,792	9,776	—	16
	<u>286,904</u>	<u>272,400</u>	<u>12,169</u>	<u>2,335</u>
<b>Prototype reactors</b>				
Gentilly-1	88,795	88,795	—	—
Douglas Point	81,739	7,056	12,009	62,674
	<u>170,534</u>	<u>95,851</u>	<u>12,009</u>	<u>62,674</u>
	<u>\$504,854</u>	<u>\$379,599</u>	<u>\$40,698</u>	<u>\$84,557</u>

Depreciation for the year ended March 31, 1981 for the above property, plant and equipment amounted to \$4,932 (1980 — \$4,636).

### b) Heavy water plants

	Cost	Write Down on Reorganization (Note 2)	Accumulated Depreciation	Net Book Value
La Prade	\$442,848	\$442,848	\$ —	\$ —
Glance Bay	258,892	240,530	18,362	—
Port Hawkesbury	101,037	82,037	19,000	—
	<u>\$802,777</u>	<u>\$765,415</u>	<u>\$ 37,362</u>	<u>\$ —</u>

## 8. Major contracts in progress

### a) International nuclear power projects:

The Company has major contracts in progress in Argentina, Korea and Romania with respect to the construction of, and/or supply of engineering services and materials, for 600 megawatt (electric) CANDU nuclear power stations.

provision of engineering and procurement services for the construction of CANDU nuclear power stations.

### c) Loss provision:

Based on current forecasts, provision for future losses in the Company's accounts remains adequate at March 31, 1981.

### b) Domestic projects:

The Company has contracts with provincial utilities in Ontario, Quebec and New Brunswick for the

## 9. Long-term debt

	(thousands of dollars)			(thousands of dollars)	
	1981	1980		1981	1980
a) Utility financing — Loans by Canada to finance provincial utility nuclear projects at interest rates varying from 7.565% to 10.0%. The notes with established terms (\$194.0 million) mature through 1992. Other notes have a 25 year amortization from the "in-service date" of the plants	\$715,480	\$704,999	c) Other long-term debt — Loans by Canada to finance leased heavy water and other assets maturing through 2003 bearing interest rates from 3.5% to 13.75%..	\$104,270	\$168,045
Current portion	31,189	9,970	Provision for employee termination benefits	17,061	14,434
	<u>\$684,291</u>	<u>\$695,029</u>		121,331	182,479
Refer to Note 5 (b) for related receivables.			Current portion	15,325	67,376
b) Heavy water plant loans (Note 2)				<u>\$106,006</u>	<u>\$115,103</u>
Loans by Canada	\$ —	\$822,641	Long-term debt includes outstanding interest of (\$'000's) 1981 — \$16,986; 1980 — \$89,144.		
Third party loans	66,060	70,338	Long-term debt is due as follows (\$'000's):		
	66,060	892,979	1983 — \$25,848; 1984 — \$30,581;		
Current portion	7,397	—	1985 — \$32,884; 1986 — \$34,207; subsequent to 1986 — \$725,440.		
	<u>\$ 58,663</u>	<u>\$892,979</u>			

## 10. Major commitments

a) In July 1969, the Company entered into a contract with Ontario Hydro whereby the Company is committed to purchase all of the Cobalt-60 produced at the Pickering generating station for a period of 30 years from the in-service date (1971) of the installation. The contract is independent of market demand and may be terminated by agreement between the parties.

b) The Company has a contract with Hydro-Quebec to supply 1,440 megagrams of heavy water by 1990 at a price that is intended to recover all relevant costs. The Company is required to repurchase up to 960 megagrams of the heavy water in 1995 if declared surplus by Hydro-Quebec. To date Hydro-Quebec has not committed to take delivery of any heavy water under the terms of this contract.



# Atomic Energy of Canada Limited

## 11. Segmented information (thousands of dollars)

a) Net income		c) Capital expenditures	
Commercial operations		Commercial operations	
Nuclear engineering, projects and heavy water	\$ 4,366	Nuclear engineering and projects	\$ 1,817
Radiation equipment and isotopes	1,334	Radiation equipment and isotopes	5,350
Corporate and investments	23,148	Corporate and investments	105
Operating profit	28,848		7,272
Nuclear research and development — net expense	(411)	Nuclear research and development	9,608
Prototype reactor operations — net expense	(14,970)	Prototype reactors	1,075
	<u>\$ 13,467</u>		<u>\$ 17,955</u>
b) Assets			
Commercial operations			
Nuclear engineering and projects	\$ 212,162		
Heavy water	72,687		
Radiation equipment and isotopes	57,155		
Corporate and investments	243,388		
	585,392		
Nuclear research and development	20,334		
Prototype reactors	62,674		
Utility loans	685,369		
	<u>\$1,353,769</u>		

## 12. Supplementary information

a) During the year the Company's Board of Directors received aggregate remuneration as directors of \$11,100 (1980 — \$13,800). The Company has 12 officers, two of whom are also directors. The aggregate remuneration received by these officers amounted to \$746,700 (1980 — \$601,500).

b) During the year, remuneration and expenses paid to the following sales agents and representatives, primarily with respect to the operations of the Radiochemical Company, aggregated \$556,524 (1980 — \$832,972):

Arab Trading & Engineering Office, Syria; Busico (M) Sdn. Bhd., Malaysia; CIA Brasileira de Radio-

logia, Brazil; Dada S.A., El Salvador; A. Bruce Edwards, U.S.A.; Equipo Para Hospitales, S.A., Mexico; Gammaster, The Netherlands; General Electric de Colombia S.A., Colombia; G.E. South Africa P.T.Y. Ltd., South Africa; International General Electric Company (India) Limited, India; Korea General Trading Corporation, Republic of South Korea; Roberto L. Lannes, Uruguay; Marubeni Corporation, Japan; Pensa Proveedora de Equipos Y Materiales S.A., Bolivia; Siemens A.G., Germany; Societa Lombarda di Televisione S.R.L., Italy; Tamathe, S.R.L., Argentina; Zelin Limited, Pakistan.

# Auditor General's Report

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The Honourable Marc Lalonde, P.C., Q.C., M.P.  
Minister of Energy, Mines and Resources,  
Ottawa, Ontario.

I have examined the balance sheet of Atomic Energy of Canada Limited as at March 31, 1981 and the statements of income, retained earnings (deficit), contributed capital and changes in financial position for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements give a true and fair view of the financial position of the company as at March 31, 1981 and the results of its operations and the changes in its financial position for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

I further report that, in my opinion, proper books of account have been kept by the company, the financial statements are in agreement therewith and the transactions that have come under my notice have been within its statutory powers.

  
Auditor General of Canada



# CANDU Performance











Ontario Hydro, one of the world's largest electric utilities, generated 35 percent of its electricity in 1980 with CANDU reactors engineered by AECL. These reactors were among the top performers of the 115 nuclear power reactors over 500 MW in operation around the world.

There are four main types of power reactors in operation around the world. These are the Boiling Water Reactor (BWR), the Pressurized Water Reactor (PWR), the Gas Cooled Reactor (GCR) and the Pressurized Heavy Water Reactor (PHWR) such as CANDU.

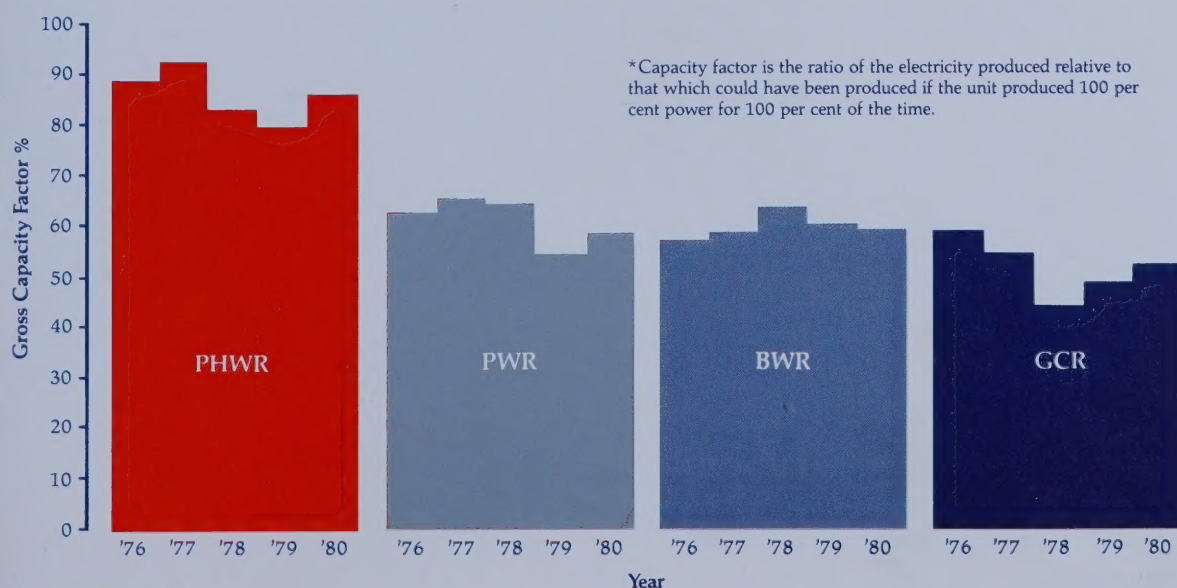
## Annual World Power Reactor Performance — 1980 (over 500 MW)

Rank	Unit	Capacity Factor*
 1	Bruce 2 (PHWR)	93.7
 2	Pickering 3 (PHWR)	92.1
 3	Bruce 3 (PHWR)	91.7
 4	Bruce 1 (PHWR)	86.5
 5	Unterweser (PWR)	86.2

## Lifetime World Power Reactor Performance to December 1980 (over 500 MW)

Rank	Unit	Capacity Factor*
 1	Bruce 3 (PHWR)	82.6
 2	Stade-1 (PWR)	82.5
 3	Pickering 2 (PHWR)	81.5
 4	Pickering 1 (PHWR)	79.5
 5	Pickering 4 (PHWR)	78.1
 6	Point Beach-2 (PWR)	78.0
 7	Bruce 4 (PHWR)	77.6
 8	Prairie Island 2 (PWR)	76.9
 9	Pickering 3 (PHWR)	76.1
 10	Calvert Cliffs 2 (PWR)	76.0

## Comparison of Average Gross Capacity Factors Ontario Hydro and World Power Reactors above 500 MW



Source: Ontario Hydro

## AECL Sites

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**Corporate Office** — 275 Slater Street, Ottawa, Canada K1A 0S4

**Atomic Energy of Canada Limited — Chemical Company** — P.O. Box 3504, Ottawa, Canada K1Y 4G1

**Glace Bay Heavy Water Plant** — P.O. Box 5, Glace Bay, Nova Scotia B1A 5V8

**Port Hawkesbury Heavy Water Plant** — P.O. Box 698, Port Hawkesbury, Nova Scotia B0E 2V0

**Atomic Energy of Canada Limited — Engineering Company** — Sheridan Park Research Community, Mississauga, Ontario L5K 1B2

**Atomic Energy of Canada Limited — Engineering Company, Montreal** — 1600 Dorchester Blvd. West, Suite 300, Montreal, Quebec H3H 1P9

**Atomic Energy of Canada Limited — International** — 275 Slater Street, Ottawa, Canada K1A 0S4

**Atomic Energy of Canada Limited — International, Toronto** — Markborough Place, 6711 Mississauga Road, Mississauga, Ontario

**Atomic Energy of Canada Limited — Radiochemical Company (Commercial Products)** — P.O. Box 6300, Station "J", Ottawa, Canada K2A 3W3

**Atomic Energy of Canada Limited — Research Company** — 275 Slater Street, Ottawa, Canada K1A 1E5

**Chalk River Nuclear Laboratories** — Chalk River, Ontario K0J 1J0

**Whiteshell Nuclear Research Establishment** — Pinawa, Manitoba R0E 1L0



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